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④⑤ **ISSUED** Dec. 24, 1974

⑤② **CLASS** 319-39
C.R. CL.

①⑨ ②A

CANADIAN PATENT

⑤④

LEAKPROOF PRIMARY CELL

⑦⑩

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Granted to P. R. Mallory & Co. Inc., Indianapolis, Indiana,
U.S.A.

②①

APPLICATION No. 108,971

②②

FILED

Mar. 29, 1971

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PRIORITY DATE

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No. OF CLAIMS

14

ABSTRACT OF THE DISCLOSURE

A leak-proof electrochemical cell having a cylindrical can closed on its bottom end, and originally open at its top end, with an internal peripheral bead as a seat for a plastic disc to be seated on the bead to cover the elements within the cell, and to receive the crimped end of the can for closure with the plastic disc constructed to have a central co-axial bore and co-axial hub around the bore to hold an anode collector in the shape of a nail whose head supports one of the terminals of the cell, here specifically the negative cap or terminal, welded to said head, and the plastic disc performs the additional function of closing the usual separator, with no intervening structure between it and the separator, to assure greater confining control of the electrolyte in said separator. The plastic disc top also constructed unitarily of full can diameter, and has an annular border disposed to provide a tight seating fit in the can at the bead as a seat, and is held in place by the crimped edge rim of the can to assure a substantially hermetic seal between the disc border and the can. An external metal jacket surrounds and is insulated from the can and has both ends crimped, with the top crimp holding the negative cap terminal to impress an additional pressure force on the metal crimped onto the plastic disc, to assure a hermetic seal under continuous pressure between those engaging surfaces of said plastic disc border and of said crimped metal at the can top.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN
EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE
DEFINED AS FOLLOWS:

1. A primary battery cell, comprising a cylindrical metal can, closed at its bottom and open at its top; an annular filling of cathodic or depolarizer material adjacent the inner surface of the wall of said can; an annular lining within said cathodic depolarizer material and constituting an ionic exchange membrane separator defining a central axial chamber; an anode electrolyte within said axial chamber; an anode collector assembly, having a plastic cap element substantially closing the upper end of said can, and having an anode collector in the shape of a nail supported by said plastic cap gripping an area of the shank of said nail with a pressed-fit to establish a hermetic seal against seepage of the electrolyte therethrough; and means for hermetically sealing the plastic cap over a border surface area of said plastic cap by a crimped-over end of the can to prevent electrolytic seepage over that area.

2. A primary battery cell, as in claim 1, in which said plastic cap element has an axially extending raised central hub portion, having a central co-axial bore and having an annular upper end face; and said nail anode collector has a flat head whose under surface rests on said annular upper-end face of said hub portion, and said anode collector nail has a shank dimension to fit tightly into said central co-axial bore when inserted and pressed thereinto, and said anode collector nail further has a continuing shank extension to extend axially into the electrolyte in the central axial chamber of said cell; and an external closing terminal plate for the cell which engages and rests on said flat head of said anode collector nail, and is electrically

welded to said flat head.

3. A primary cell, as in claim 2, in which said external closing terminal plate is spot welded to said flat surface on said nail head, to provide the electrical connection from said nail-shaped anode collector to said external terminal plate; and said anode collector nail is made of an alloy having a nickel content to provide good resistance welding characteristics, as exhibited with nickel contents of 8 to 18%.

4. A primary battery cell, as in claim 2, in which said closing terminal plate embodies a central flat surface circular area, with a circular rim surrounding said central area, and disposed to press on said crimped-over end of said metal can through an insulating medium.

5. A primary battery cell, as in claim 4, including, further, an insulating member disposed and held between said circular rim of said terminal plate and the top surface of said crimped-over end of said cathode can, to insulate said terminal plate connected to the anode nail from the crimped end of the cathodic can.

6. A primary battery cell, as in claim 5, in which said terminal plate embodies an encircling rim; an insulating tube encircles said can; a metallic jacket tube encircles said insulating tube with one crimped-over end of said metallic jacket tube crimping the corresponding end of said insulating tube on said encircling rim of said terminal plate, and the crimped-over other end of said metallic jacket tube is anchored at the corresponding other end of said cylindrical metal can.

7. A primary battery cell, as in claim 6, in which a ter-

minal means is disposed at the bottom end of said cylindrical metal can; and said crimped-over other end of said metallic jacket tube is insulatively secured to said terminal means at said bottom end to hold said terminal means electrically in contact with said bottom of said cylindrical metal can.

8. A primary battery cell, comprising a cylindrical metal can, closed at its bottom and open at its top; an annular filling of cathodic or depolarizer material adjacent the inner surface of the wall of said can; an annular lining within said cathodic depolarizer material and constituting an ionic exchange membrane separator defining a central axial chamber; said separator being of diameter smaller than the can and the depolarizer material; an anode electrolyte within said axial chamber; an anode collector assembly, having an anode collector in the shape of a nail supported by said plastic cap gripping an area of the shank of said nail with a pressed-fit to establish a hermetic seal against seepage of the electrolyte therethrough; said plastic cap having an undercut shoulder formed at the periphery of the plastic cap and also having an apron downwardly extending into contact with said depolarizer material and being positioned between said shoulder and said collector nail to surround the top open end of the separator; a bead formed peripherally around the inner surface of said can to extend radially inwardly to serve as a direct contact circular seat for said plastic cap at said undercut shoulder; said separator having a top open end folded inwardly toward closure by the apron on the plastic cap when said cap is directly seated on the bead in the can to close the cell; and means for hermetically sealing the plastic cap over a border surface area of said plastic cap by a crimped-over end of the can to prevent electrolyte seepage over that area; and an external closing terminal plate for the cell which seals the anode collector assembly wholly within the cell can and prevents said plastic cap from extending outside of said cell

can.

9. A primary battery cell, as in claim 8, in which said plastic cap element has an axially extending raised central hub portion, having a central co-axial bore and having an annular upper end face; and said nail anode collector has a flat head whose under surface rests on said annular upper-end face of said hub portion, and said anode collector nail has a shank dimension to fit tightly into said central co-axial bore when inserted and pressed thereinto, and said anode collector nail further has a continuing shank extension to extend axially into the electrolyte in the central axial chamber of said cell; and an external closing terminal plate for the cell which engages and rests on said flat head of said anode collector nail, and is electrically welded to said flat head.

10. A primary cell, as in claim 9, in which said external closing terminal plate is spot welded to said flat surface on said nail head, to provide the electrical connection from said nail-shaped anode collector to said external terminal plate; and said anode collector nail is made of an alloy having a nickel content to provide good resistance welding characteristics, as exhibited with nickel contents of 8 to 18 percent.

11. A primary battery cell, as in claim 9, in which said closing terminal plate embodies a central flat surface circular area, with a circular rim surrounding said central area, and disposed to press on said crimped-over end of said metal can through an insulating medium.

12. A primary battery cell, as in claim 11, including, further, an insulating member disposed and held between said circular rim of said terminal plate and the top surface of said crimped-over end of said cathode can, to insulate said terminal plate connected to the anode nail from the crimped end of the cathodic can.

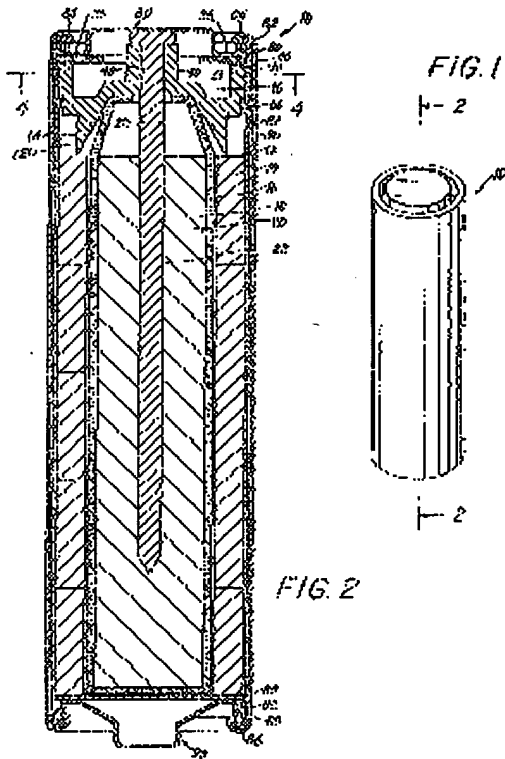
13. A primary battery cell, as in claim 12, in which said terminal plate embodies an encircling rim; an insulating tube encircles said can; a metallic jacket tube encircles said insulating tube with one crimped-over end of said metallic jacket tube crimping the corresponding end of said insulating tube on said encircling rim of said terminal plate, and the crimped-over other end of said metallic jacket tube is anchored at the corresponding other end of said cylindrical metal can.

14. A primary battery cell, as in claim 13, in which a terminal means is disposed at the bottom end of said cylindrical metal can; and said crimped-over other end of said metallic jacket tube is insulatively secured to said terminal means at said bottom end to hold said terminal means electrically in contact with said bottom of said cylindrical metal can.





CANADA



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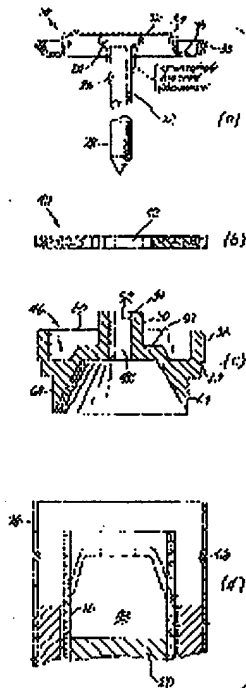
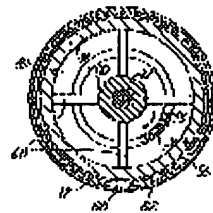


FIG. 3

FIG. 4



W. Karana
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